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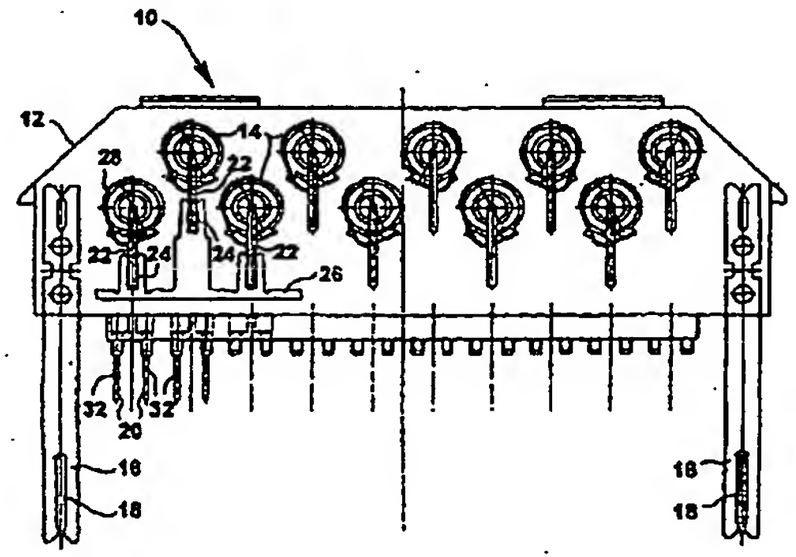
(54) Title: OVERVOLTAGE PROTECTION MAGAZINE FOR A DEVICE USED IN TELECOMMUNICATIONS ENGINEERING

(54) Bezeichnung: ÜBERSPANNUNGSSCHUTZMAGAZIN FÜR EINE EINRICHTUNG DER TELEKOMMUNIKATIONSTECHNIK

(57) Abstract

The invention relates to an overvoltage protection magazine (10) for a device used in telecommunications engineering, comprising a housing (12) with a front, back, top and bottom side and several tapping contacts (20) which extend along a section (32) from the rear side of the housing and, once mounted, tap contacts of the device used in telecommunications engineering. The invention also provides for at least one earth terminal (16) and several overvoltage protectors (14) which can be inserted into the overvoltage protection magazine (10) and comprise terminal pins (22) which when inserted are directly connected to the contacts (20) in an electrically conductive manner. To save space the overvoltage protectors (14) can be inserted into the magazine (10) alternately from above and below so that the terminal pins (22) in their inserted state extend either towards the bottom or the top in such a way that, viewed from the front side, they are staggered in relation to each other.



(57) Zusammenfassung

Ein Überspannungsschutzmagazin (10) für eine Einrichtung der Telekommunikationstechnik weist ein Gehäuse (12) mit einer Vorder–, einer Rück–, einer Ober– und einer Unterseite auf, wobei sich mehrere Abgreifkontakte (20) mit einem Abschnitt (32) von der Gehäuserückseite erstrecken und im angebrachten Zustand Kontakte der Einrichtung der Telekommunikationstechnik abgreifen. Ferner ist zumindest ein Erdkontakt (16) vorgesehen, und in das Überspannungsschutzmagazin (10) sind mehrere Überspannungsableiter (14) einsetzbar, die Beinchen (22) aufweisen, die im eingesetzten Zustand mit den Kontakten (20) unmittelbar elektrisch leitend verbunden sind. Zur Platzersparnis sind die Überspannungsableiter (14) wechselweise von der Ober– und Unterseite in das Magazin (10) einsetzbar, so dass sich die Beinchen (22) in dem eingesetzten Zustand jeweils zur Unter– bzw. Oberseite hin erstrecken, so dass sie von der Vorderseite aus betrachtet zueinander versetzt angeordnet sind.

A protective surge-voltage magazine for a telecommunications engineering device

Technical field

The invention relates to a protective surge-voltage magazine for a telecommunications engineering device.

In telecommunications engineering, wide-spread use is made of protective surge-voltage magazines that are attached to telecommunications engineering devices, such as terminal strips, in order that electronic components or equipment connected to the aforementioned device can be protected from surge voltages. In contrast to safety plugs assigned to individual twin wires, ordinary protective magazines comprise a plurality of surge arresters and are also designed so as to be able to be fitted on to the usually elongate telecommunications engineering devices in such a way that in each case the applied voltage is tapped by all the contacts of such a device. For this purpose, known protective surge-voltage magazines comprise a plurality of contacts that extend with a portion from the back of the housing of the protective surge-voltage magazine, i.e. from that side facing toward the terminal device, and in the attached state, tap the contacts of the telecommunications engineering device.

Surge arresters that can be inserted into the protective surge-voltage magazine are electrically connected to these tap contacts, thereby also causing a surge voltage applied to the tap contact of the protective surge-voltage magazine to be applied to the individual surge arrester. If a specific voltage is exceeded, the surge arrester is triggered and it directs the electrical current to earth. For this purpose, the

protective surge-voltage magazines have an earth contact that is connected to earth.

Prior art

A protective surge-voltage magazine is known from DE 30 14 796 C3. Each twin wire is protected by a surge arrester. The twin wires to be connected to an assigned terminal device are inserted in parallel into the protective surge-voltage magazine from a front housing side. In a typical arrangement, 10 twin wires may be connected to a magazine having 10 surge arresters. The surge arresters are wired components that have struts directly connected to the protective surge-voltage magazine's tap contacts. For this purpose, not only the tap contacts but also the earth contact are bent into the shape of a U at those sections at which they contact the surge-arrester struts, thus causing the surge-arrester struts to be electrically contacted on the inner surfaces of the U-shaped portions of the tap contacts.

The shape not only of the tap contacts but of the earth contact as well is comparatively complex. This is due to the fact that the bending edges for the formation of the U-shaped region do not run parallel to those bending edges that are provided in the further course of the contacts for the formation of those sections that are used to tap the contacts of the terminal device. Due to the need for bending operations around non-parallel bending edges, the process of making the tap and earth contacts for such a protective surge-voltage magazine is therefore a complicated one.

Furthermore, the structural size of the magazine in this known protective surge-voltage magazine is necessarily defined by the amount of space needed by the surge arresters inserted side by side. In other words, the width of such a protective surge-voltage magazine cannot be smaller than the dimension of the surge arresters positioned side by side in the required

number. Due to the defined structural size, this known protective surge-voltage magazine therefore restricts the ability to reduce the amount of space needed by the telecommunications engineering devices including the protective surge-voltage magazines fitted thereon.

A surge arrester device for break strips is known from DE 31 13 759 C2; in this device, a plurality of wired surge arresters can be inserted from the upper housing side, the struts of the surge arresters being only indirectly connected to the tap contacts, namely via so-called clamping sensors. Due to this fact and as a result of the comparatively large structural size of this known magazine, this kind of magazine also requires improvement.

A safety plug for terminal and break strips that comprises a plurality of unwired surge arresters is known from DE 42 25 484 C1. The unwired, largely cylindrical surge arresters are contacted by a contact cage which must nevertheless be complex in design and is also unsuitable for contacting wired surge arresters that are to be used in accordance with the class.

This equally applies to the magazine known from DE 34 30 922 A1; this magazine has a printed circuit board, whose contact tracks tap the contacts of the terminal device. Simply because it needs a printed circuit board, this magazine suffers from drawbacks in economic terms.

Description of the invention

The invention seeks to provide a protective surge-voltage magazine which has a simple structure, thus enabling the magazine to be produced with minimum outlay. The magazine can also be designed on a particularly small scale.

We have now found a protective surge-voltage magazine for a telecommunications engineering device comprising

- a housing having a front, a back, a top and a bottom,

- a plurality of contacts extending with a section from the back of said housing and tapping contacts of the telecommunications engineering device in the mounted state, and

- at least one earth contact,

- a plurality of surge arresters being insertable into said protective surge-voltage magazine, said surge arresters having struts directly electroconductively connected to said contacts in the inserted state,

wherein

- said contacts each have a contact slot defined by two contact shanks located substantially on a plane,

- said surge arresters can be inserted from the front of said housing toward their struts such

- that in the inserted state, each strut extends into said contact slot in a direction substantially parallel thereto, and

- said surge arresters are alternately located on at least two different levels with respect to the extension of depth of said protective surge-voltage magazine so as to be staggered in relation to one another when viewed from the top.

Accordingly, the tap contacts to which the surge-arrester struts are directly connected are designed such as to comprise a contact slot defined by two contact shanks that are largely positioned on a plane. This makes it possible to avoid complicated bending operations as far as the tap contacts are concerned, because the contact slot is not formed by bending a strip-shaped section into a U-shape, but by punching out the contact slot within the strip-shaped contact. In consequence, two sheet-metal strips that are largely positioned on a plane and represent the contact shanks define, between them, the contact slot. Directly contacting the struts of the surge arresters between the two contact shanks advantageously avoids the need for a printed circuit board, thus making it possible to keep production outlay for the protective surge-voltage magazine to a minimum. The tap contacts designed in the described manner can also be particularly easily produced by means of simple punching and bending processes that may in particular occur around edges that are parallel to one another.

In this first embodiment of the invention, the surge arresters can be inserted into the magazine from the front housing side toward their struts such as to extend the struts into the contact slot in a direction largely perpendicular thereto. Contacting the struts of wired surge arresters in this way represents a significant improvement as regards a surge-arrester magazine. As will be explained in further detail below, the entire structure of the protective surge-voltage magazine can be considerably simplified as a result.

The described direction of insertion from the front housing side does in fact also make it possible in this particular embodiment for the surge arresters in their inserted state to be alternately positioned on at least two different levels with respect to the extension of the protective surge-voltage magazine's depth. In other words, when viewed from the top side, the surge arresters are staggered in relation to one

another. When viewed in this way, the largely cylindrical surge arresters, can be identified as circles. In conventional protective surge-voltage magazines, all the centres of these circles are located on a line, with the result that the amount of space needed is defined by the sum of the diameters and cannot be reduced further.

In accordance with the invention, the individual surge arresters, when viewed from the top side, maybe staggered in relation to one another such that their centres are located on a zigzag. This makes it possible to decrease the width of the magazine and allow a considerable saving in space in combination with correspondingly designed telecommunications engineering terminal devices. For this purpose, the tap contacts that tap the terminal-device contacts extend to alternately different extents toward the front side of the protective surge-voltage magazine, thus making it possible to contact the surge arresters introduced to varying extents from the front side. In this embodiment of the protective surge-voltage magazine according to the invention, a space-saving magazine design is therefore provided while keeping the structure simple.

In this first embodiment the protective surge-voltage magazine preferably includes a housing, the front of which may be closed by a detachable cover. Preferably the cover is transparent.

The protective surge-voltage magazine of the first embodiment of the present invention preferably comprises an earth bus to which one strut of the surge arresters at a time is directly connected in the inserted state.

The front side of the housing can preferably be closed by a detachable cover so that the fully equipped magazine produces a self-contained impression, and the inserted surge arresters

as well as the contacts and arresters accommodated within the magazine are protected from dirt accumulation.

A particularly simple structure is also obtained by providing the protective surge-voltage magazine with an earth bus to which one surge-arrester contact at a time is directly connected in the inserted state. In other words, a direct electrical connection between the surge-arrester struts and the tap contacts is also applied to the earth contact in the form of an earth bus so that any intermediate contacts or any printed circuit boards required in the prior art can also be avoided in this region.

In a second embodiment the present invention provides a protective surge-voltage magazine according to any one of claims 1 to 3, wherein said magazine comprises an earth bus to which one strut of said surge arresters at a time is directly connected in the inserted state.

In this second embodiment of the invention, the structural size of the protective surge-voltage magazine is advantageously reduced as compared to the magazines known in the prior art in that the surge arresters can be inserted into the magazine in a staggered manner. In this second embodiment, the surge arresters can be inserted into the magazine alternately from the upper and lower sides, whereby the struts each extend toward the lower or upper side in the inserted state. The staggered configuration of the surge arresters is therefore identifiable from the front side in this embodiment. When viewed from this direction, the surge arresters, which can be inserted from above or below in the direction of their struts, appear as circles. Similar to the embodiment described above, but rotated through 90°, the surge arresters, which are circular when viewed from the front side, are staggered in relation to one another, with their centres being positioned on a zigzag. The struts of the surge arresters inserted from

the top extend between two surge arresters that are inserted adjacent to one another from the lower side.

In this second embodiment of the invention, the need for a printed circuit board or intermediate contacts can also be avoided. Another benefit of this second embodiment is that the structural size can be considerably reduced compared to the prior art in that the aforementioned staggered configuration allows the width of the protective surge-voltage magazine to be reduced with respect to the sum of the diameters of the inserted surge arresters.

In the second embodiment of the invention, the magazine's earth contact is preferably electrically connected to an elongate earth bus whose sheet-metal plane extends at an angle of about 90° to the plane of the earth contact. This allows the earth bus to be easily connected to the at least one earth contact by means of clamping.

In this case, the use of intermediate contacts has proved particularly advantageous for the purpose of connection to the earth bus.

As regards the tap contacts and/or intermediate contacts, it is also preferred for these contacts to be provided with contact slots that are delimited by two elongate contact shanks located on a plane. The thus designed contacts can be made as result of punching and a simple bending operation, permitting a reliable and direct electrical connection between the surge-arrester struts and the contacts.

As is the case with the first embodiment, it is also preferred that the surge-arrester struts can be introduced into the contact slots parallel therewith. This orientation of the struts in relation to the contact slots - which is so far unknown in the technology employed for protective surge-voltage magazines - allows the structure of the

protective surge-voltage magazine to be simplified as a whole. This will be made all the more apparent from the following description of the preferred exemplary embodiments based on the drawings.

As regards the compensation of tolerances at the contacts provided with the described contact slots, there are benefits to forming a narrow section adjacent to at least one contact shank. As a result, the area of the contact slot as a whole may tilt somewhat resiliently so as to allow production tolerances to be compensated, thus always enabling the struts to be reliably electroconductively contacted.

As already mentioned, all the embodiments of the invention enjoy considerable advantages if the tap and/or intermediate contacts in use are formed as sheet-metal members provided with at least one bend section parallel to the plane of the sheet metal. As a result, the contacts can, with minimum outlay, be given the shape that is necessary for contacting not only the contacts to be tapped on the terminal device but also the surge-arrester struts. In the case of a multiple bend, all the bending edges can be aligned in parallel to one another, which simplifies manufacturing.

Lastly, as regards the reliable and positionally accurate introduction of the surge arresters, there are advantages if guides for the surge-arrester struts are provided in the housing of the protective surge-voltage magazine. This ensures the correct arrangement of the struts particularly if - as described - the struts are aligned parallel to a contact slot delimited by two strip-shaped contact shanks.

Brief description of the drawings

A few of the invention's embodiments illustrated by way of example in the figures will now be explained in further detail.

Fig. 1 shows a top view of the protective surge-voltage magazine according to a first embodiment of the invention;

Fig. 2 shows a front view of the protective surge-voltage magazine illustrated in Fig. 1;

Fig. 3 shows a cross-sectional view of the protective surge-voltage magazine illustrated in Figs. 1 and 2 at a point where a surge arrester is inserted at a lower level;

Fig. 4 shows a cross-sectional view of the protective surge-voltage magazine illustrated in Figs. 1 and 2 at a point where a surge arrester is inserted at a higher level;

Fig. 5 shows a top view of the protective surge-voltage magazine according to a second embodiment of the invention;

Fig. 6 shows a front view and partial section of the protective surge-voltage magazine illustrated in Fig. 5;

Fig. 7 shows a cross-sectional view of the protective surge-voltage magazine illustrated in Figs. 5 and 6 at a point where a surge arrester has been inserted from the lower side; and

Fig. 8 shows a cross-sectional view of the protective surge-voltage magazine illustrated in Figs. 5 and 6 at a point where a surge arrester has been inserted from the upper side.

Detailed description of preferred exemplary embodiments of the invention

Fig. 1 illustrates a top view of the protective surge-voltage magazine 10 according to the invention; for the purpose of explanation, the magazine has a transparent housing 12. As a result, the staggered configuration of the individual surge arresters 14 can be identified. The two lateral edge regions of the housing 12 each contain an earth contact 16 by means of which power is led off to earth in the event that too high a voltage is applied at one of the contacts of the telecommunications engineering device (not illustrated) on which the depicted protective surge-voltage magazine 10 is mounted. For this purpose, the two earth contacts 16 have a contact slot 18 into which e.g. one shank of a metallic carrier system at a time is introduced such as to electrically connect the earth contact 16 to the carrier system and allow electrical current to be directed to earth via the carrier system.

A plurality of tap contacts 20 extend from the protective surge-voltage magazine 10 at the back of the protective surge-voltage magazine 10' - this back is located at the bottom of the illustration according to Fig. 1 and faces toward the telecommunications engineering device during use. Each of these tap contacts 20 is electrically connected, at a tapping site, to the two mutually assigned contacts of the telecommunications engineering device. One strut of the surge arrester 14 at a time is inserted into a terminal slot formed in the tap contact 20 at its other end - which is the upper end according to Fig. 1 - thus directly connecting this strut

to the tap contact 20, which will be explained in more detail below with reference to Figs. 2 to 4.

The only thing that can be identified in the top view of Fig. 1 is that the central strut of each surge arrester 14 extends into a respective contact slot 24 formed at different heights of a common earth bus 26. If the voltage applied to the surge arrester 14 does in fact exceed a certain value, the surge arrester 14 is triggered and directs the electrical current to the earth bus 26 via its respective central strut 22; the earth bus is connected to both earth contacts 16 (not illustrated). The clip 28 attached in each case around the surge arrester 14 is also a normal fail-safe device.

The staggered and particularly space-saving arrangement of the surge arresters 14 within the protective surge-voltage magazine 10 is also apparent from the illustration of Fig. 1. As can be immediately identified, the width of the protective surge-voltage magazine 10 is defined by the sum of the diameters of the surge arresters 14 in the case of a normal configuration of the surge arresters 14 in which the centres or cylindrical axes, i.e. each upper end of the depicted strut 22 according to the illustration of Fig. 1, are located on a line. Since the individual surge arresters 14 also have to be separated from one another, and because partitions may have to be formed between the surge arresters, the width of the protective surge-voltage magazine 10 cannot be reduced below a certain value. In accordance with the invention, however, tapering is made possible by alternately positioning the surge arresters 14 at different levels, i.e. at a different height according to the illustration of Fig. 1. As a result, the surge arresters 14 can be moved more closely together when viewed in the direction of width. Due to the greater distance between the surge arresters 14, it is also possible to dispense with partitions, which also has an advantageous effect on the necessary structural size.

The struts of the interposed surge arrester 14 at the front level and the tab of the earth bus 26 extending to the strut 22 are located in the space between two surge arresters 14 at the rear level - which is the lower level according to the illustration of Fig. 1. The necessary space can therefore be considerably reduced by simple constructional measures. The surge arresters 14 can also be inserted from the front housing side which is located at the top of the illustration of Fig. 1, whereby the surge arresters 14 positioned at the front level can be immediately removed. The surge arresters 14 positioned at the rear level can be removed as a result of the fact that they lie uncovered at both the upper and lower sides when the cover is opened, which according to a preferred embodiment of the invention, can be achieved by a U-shaped cover. In its fitted state, this cover therefore covers not only the front side of the housing, but also those sections of the upper and lower sides that are adjacent thereto. This measure, which can be applied to the protective surge-voltage magazine according to the invention, also enables the surge arresters 14 located at the rear level to be encompassed from above and below, thus allowing them to be pulled out forwards at least to a certain extent, and then allowing them to be removed upwards or downwards if their struts and the contact slots have been correspondingly dimensioned. Alternatively, it is possible, as regards the removal of the surge arresters 14 at the rear level, to first remove at least one of the adjacent surge arresters 14 positioned at the front. The individual struts of the surge arresters 14 are electrically connected to the earth bus 26 and the tap contacts 20 without any need for a printed circuit board, and the earth bus and tap contacts can thus be particularly simple in design, which is made apparent in Fig. 2.

Fig. 2 shows the protective surge-voltage magazine 10 from the front with an opened cover, whereby for the sake of clarity, only the front surge arresters 14 are illustrated. As shown by the illustration of Fig. 2 in conjunction with Fig. 1, these

surge arresters are largely cylindrical and comprise respective lateral struts 30 in addition to the struts 22 that extend in the centre. These struts 30 extend into a respective contact slot of a tap contact 20, which will be even more apparent from Figs. 3 and 4. The individual tap contacts comprise a section 32 that extends from the rear housing side, as can be identified in Fig. 1. All the portions 32 are located on a central line 34 in relation to the height of the protective surge-voltage magazine 10, which is evident from Fig. 2.

The section 36 that serves to introduce a respective strut 30 is aligned at an angle with respect to the tapping section 32. As will be even more apparent from Figs. 3 and 4, the section 36 with the contact slot comprises two strip-shaped contact shanks that are largely located on a plane and which between them define the contact slot. According to the illustration of Fig. 2, the contact shanks extend perpendicular to the plane of projection, and the struts 30 are each introduced into the contact slot parallel to the contact shanks. The individual tap contact 20 can therefore be easily produced by punching out the necessary shape and by forming a single bend through about 45° at the transition between the sections 32 and 36. As is also evident from the illustration of Fig. 2, all those tap contacts 20 that serve to contact the struts 30 of the front surge arresters 14 may be completely identical in design, which simplifies production further. This also applies to all those tap contacts which serve to contact the struts of the rear surge arresters 14.

As can be identified in Figs. 3 and 4, the tap contacts 20 that serve to contact the struts of the rear surge arresters 14 differ from those that are connected to the struts of the front surge arresters 14. Fig. 3 shows a cross-sectional view through the described protective surge-voltage magazine 10 at a point where there is a surge arrester 14 inserted at the rear level. This "rear" level is defined in that it is located

closer to the tap sections 32 of the tap contacts 20 which reach into the telecommunications engineering device (not shown) on which the protective surge-voltage magazine 10 is fitted during use. In the mounted state, the magazine is also in an orientation that is rotated through 90° with respect to the alignment of Figs. 3 and 4. For the sake of simplicity, the protective surge-voltage magazine 10 is shown upright in Figs. 3 and 4, just as it is in Fig. 1, which means that the "rear" level appears as the lower level.

As can be identified in Fig. 3, the tap contact 20 is composed of the described narrow, strip-shaped tap section 32 that extends as far as the rear of the housing. A web 38 extending to the section 36 with the contact slot 40 that serves to introduce the strut 30 is formed in this region. The sheet-metal plane is bent between the tap section 32 and the contact section 36, as can be identified in Fig. 2, causing the contact section 36 to extend at an angle to the plane of projection of Figs. 3 and 4. As a result, the tap contact 20 is particularly simple in design so that no further bends are necessary either, but the contact slot 40 is defined by two planar, largely strip-shaped contact shanks 42 that are located on a plane and can be easily formed upon punching out the tap contact 20.

The strut 30 of the surge arrester 14 is introduced into the contact slot 40 parallel to the contact shanks 42, the movement of insertion being assisted by guides (not shown) formed in the housing of the protective surge-voltage magazine 10. The structure of the protective surge-voltage magazine 10 according to the invention is therefore particularly simple because no printed circuit board or complicated bends in the tap contact 20 are necessary in order to connect the struts 30 to the tap contacts 20. The central strut 22 of the surge arrester 14 introduced into the earth bus 26 that extends perpendicular to the plane of projection can also be identified in Fig. 3. Finally, it should also be noted that

both contact shanks 42 together form the shape of a U which is connected to the web 38 via a comparatively narrow connecting web 44. Due to the narrow section formed by the narrow connecting web 44, the contact portion 36 may possibly be tilted a little, which allows production tolerances to be compensated.

As can be identified in Fig. 4, such a measure with lateral narrow sections 46 is also provided for the tap contacts 20 that serve to contact the struts 30 of the surge arresters 14 placed at the front level. The individual tap contact 20 is essentially identical in design with the tap contact 20 shown in Fig. 3, with the exception that the connecting web 44 between the contact region 36 and the web 38 leading to the tap section 32 is longer. As a result, the contact section 36 is located at a level further forward, i.e. at a higher level according the illustration of Fig. 4, thus enabling the struts 30 of the surge arresters 14 that are located at the front level and that do not differ from the rear surge arresters 14 to be directly contacted.

Fig. 5 shows a top view of a second embodiment of the protective surge-voltage magazine 10 according to the invention in which the same principles apply as was the case with the embodiment described above. In this embodiment, the individual surge arresters' staggered configuration that is envisaged for the purpose of saving space can nevertheless be identified in the front view of Fig. 6 described below. In this embodiment, the staggered configuration is achieved in that the surge arresters can be alternately inserted from the upper and lower sides of the housing 12.

Accordingly, just five receiving portions for the surge arresters can be identified in the top view of Fig. 5, whereby the shape of the contacts that are used to contact the struts of the surge arresters inserted from the lower side can, in

each case, be identified between the three receiving portions identifiable in the left-hand half.

In particular, the embodiment of Fig. 5 also comprises an earth contact 16 for each of the two lateral edges, the two earth contacts also being provided at their upper end with a contact slot into which an earth bus 26 rotated through 90° with respect to its sheet-metal plane can be introduced with its ends. In other words, the earth bus 26 is a metal strip positioned perpendicular on the plane of projection of Fig. 5 and bent toward the earth contacts 16 at both its ends. Respective intermediate contacts 48 are clamped on to the earth bus 26 via terminal slots, which is more accurately apparent from Fig. 8. At those ends remote from the earth bus 26, the intermediate contacts 48 comprise respective contact slots which serve to introduce the central struts of the surge arresters 14, i.e. those struts which serve to lead energy away. As is the case for the tap contacts 20 used in the embodiment described above, the intermediate contacts 48 can also be produced with minimum outlay by means of a simple punching operation and a simple bend.

This equally applies to the tap contacts 20, as can also be identified in Fig. 5. These tap contacts, like the tap contacts described in conjunction with the first embodiment, comprise a tap section 32 that extends from the rear housing side to the telecommunications engineering device, and are provided at their other end with a contact region that is identical with the contact region 36 of the tap contacts 20 identifiable in Figs. 3 and 4 and serves to introduce the struts 30 into a respective contact slot in an alignment parallel thereto.

Explained as an example by means of the surge arrester receiving portion identifiable in Fig. 5 at the far left, the contact shanks that delimit the contact slot extend in the direction of the viewer of Fig. 5. In the area surrounding the

contact portion 36 that can be identified in the top view as a narrow rectangle, the housing 12 of the protective surge-voltage magazine 10 contains guides which are used for the correct alignment of the surge-arrester struts 30 that also extend, in the mounted state, perpendicular to the plane of projection. The fact that the surge arresters 14 can be inserted into the housing alternately from above and below makes it possible to arrange the individual surge arresters 14 in a particularly space-saving manner, as can be identified in Fig. 6.

In the front view with partial section, it is possible in Fig. 6 to identify the staggered configuration exhibited by the individual surge arresters 14 that can be inserted alternately from the upper or lower sides in the direction of extension of their struts 30. The struts of the surge arresters inserted from the lower side extend toward the upper side. The contact regions of the tap and intermediate contacts are located in those areas adjacent to the upper side. The opposite case correspondingly applies to those surge arresters 14 that are inserted from the upper side and whose struts, together with the contact sections used for contacting, are each located at the lower side in the region between two adjacent surge arresters 14 inserted from the lower side. In this embodiment, surge arresters 14 can also be used with a fail-safe device, which can be identified in Fig. 6 by means of the clips 28. In an alignment rotated through 90° with respect to the alignment of the surge arresters according to the first embodiment, as can be identified in Fig. 1, the central points of all the surge arresters 14 inserted in the embodiment of Fig. 6 are likewise not located on a straight line, but on a zigzag. The lateral dimension of the protective surge-voltage magazine 10 can therefore be advantageously reduced. This is particularly achieved by the insertability alternately from the upper and lower sides.

The electrical connection of the struts 30 and 22 to the tap contacts 20 or intermediate contacts 48 - a connection that can be identified in Figs. 7 and 8 - also simplifies the structure of the protective surge-voltage magazine 10. As can be identified in Fig. 7 for a surge arrester 14 inserted from the lower side, the tap contact 20 is similar in design to the tap contact 20 illustrated in Fig. 4 for the first embodiment, whereby the contact region 36 is formed on the connecting web 44 in an alignment rotated through 90°. There are in turn narrow sections 46 at the transition between the contact region 36 and the connecting web 44 in order, if necessary, to compensate production tolerances as a result of the tilting option. The struts 36 are introduced directly into the respective tap contact 20 without any need for intermediate contacts or a printed circuit board. The assisting guides are formed in a partition of the housing. The individual tap contact 20 can be punched out as a simple component and provided with the single necessary bend in the area of the connecting web 44, as is evident from Fig. 7 in conjunction with Fig. 5.

Fig. 8 shows how a strut 30 and the central strut 22 are contacted by way of example for a surge arrester 14 inserted from the upper side. The tap contact 20 used for contacting the strut 30 essentially corresponds to the tap contact 20 shown in Fig. 7 with a shorter connecting web 44. At its lower end according to Fig. 8, the intermediate contact 48 comprises a contact region which is similar to the above-described contact regions 36 of the tap contacts 20. At its upper end according to Fig. 8, the intermediate contact 48, which is also bent just once (cf. Fig. 5), is provided with another contact slot by means of which it is clamped to the earth bus 26. This connection is therefore also directly effected and does not require any printed circuit board or the like. Finally, the two-part structure of the housing with housing halves that can latch on to one another can be identified in Figs. 7 and 8.

Claims

1. A protective surge-voltage magazine for a telecommunications engineering device comprising

   - a housing having a front, a back, a top and a bottom,

   - a plurality of contacts extending with a section from the back of said housing and tapping contacts of the telecommunications engineering device in the mounted state, and

   - at least one earth contact,

   - a plurality of surge arresters being insertable into said protective surge-voltage magazine, said surge arresters having struts directly electroconductively connected to said contacts in the inserted state,

   wherein

   - said contacts each have a contact slot defined by two contact shanks located substantially on a plane,

   - said surge arresters can be inserted from the front of said housing toward their struts such

   - that in the inserted state, each strut extends into said contact slot in a direction substantially parallel thereto, and

   - said surge arresters are alternately located on at least two different levels with respect to the extension of depth of said protective surge-voltage

magazine so as to be staggered in relation to one another when viewed from the top.

2. A protective surge-voltage magazine according to claim 1, wherein
the front of said housing can be closed by a detachable cover.

3. A protective surge-voltage magazine according to claim 2 wherein the detachable cover is transparent.

4. A protective surge-voltage magazine according to any one of claims 1 to 3,
wherein
said magazine comprises an earth bus to which one strut of said surge arresters at a time is directly connected in the inserted state.

5. A protective surge-voltage magazine for a telecommunications engineering device comprising

- a housing having a front, a back, a top and a bottom,

- a plurality of contacts extending with a section from the back of said housing and tapping contacts of the telecommunications engineering device in the mounted state, and

- at least one earth contact,

- a plurality of surge arresters being insertable into said protective surge-voltage magazine, said surge arresters having struts directly connected to said contacts in the inserted state,

wherein

said surge arresters can be inserted into said magazine alternately from the top and bottom, said struts each extending toward the bottom or top in the inserted state so as to be staggered in relation to one another when viewed from the front.

6. A protective surge-voltage magazine according to claim 5, wherein
said earth contact is electrically connected to a elongate earth bus wherein the plane of said elongate earth bus extends at an angle of about 90° to the plane of said earth contact.

7. A protective surge-voltage magazine according to claim 5 or 6,
wherein
in the inserted state, one strut of said surge arrester at a time is electrically connected to said earth bus via an intermediate contact.

8. A protective surge-voltage magazine according to any one of claims 5 to 7,
wherein
said contacts and/or intermediate contacts are provided with contact slots defined by two elongate contact shanks located on a plane.

9. A protective surge-voltage magazine according to claim 8, wherein
said struts of said wired surge arresters can be introduced into said contact slots parallel thereto.

10. A protective surge-voltage magazine according to any one of the preceding claims,
wherein
a narrow section is adjacent to at least one contact shank.

11. A protective surge-voltage magazine according to any one of the preceding claims,
wherein
said contacts and/or intermediate contacts are designed as sheet-metal members and are provided with at least one bend section parallel to the plane of the sheet-metal, all the bending edges being parallel to one another in the case of a multiple bend.

12. A protective surge-voltage magazine according to any one of the preceding claims,
wherein
guides for said struts of said surge arresters are provided in said housing.

13. A protective surge-voltage magazine substantially as hereinabove described with reference to the examples.

FIG.1

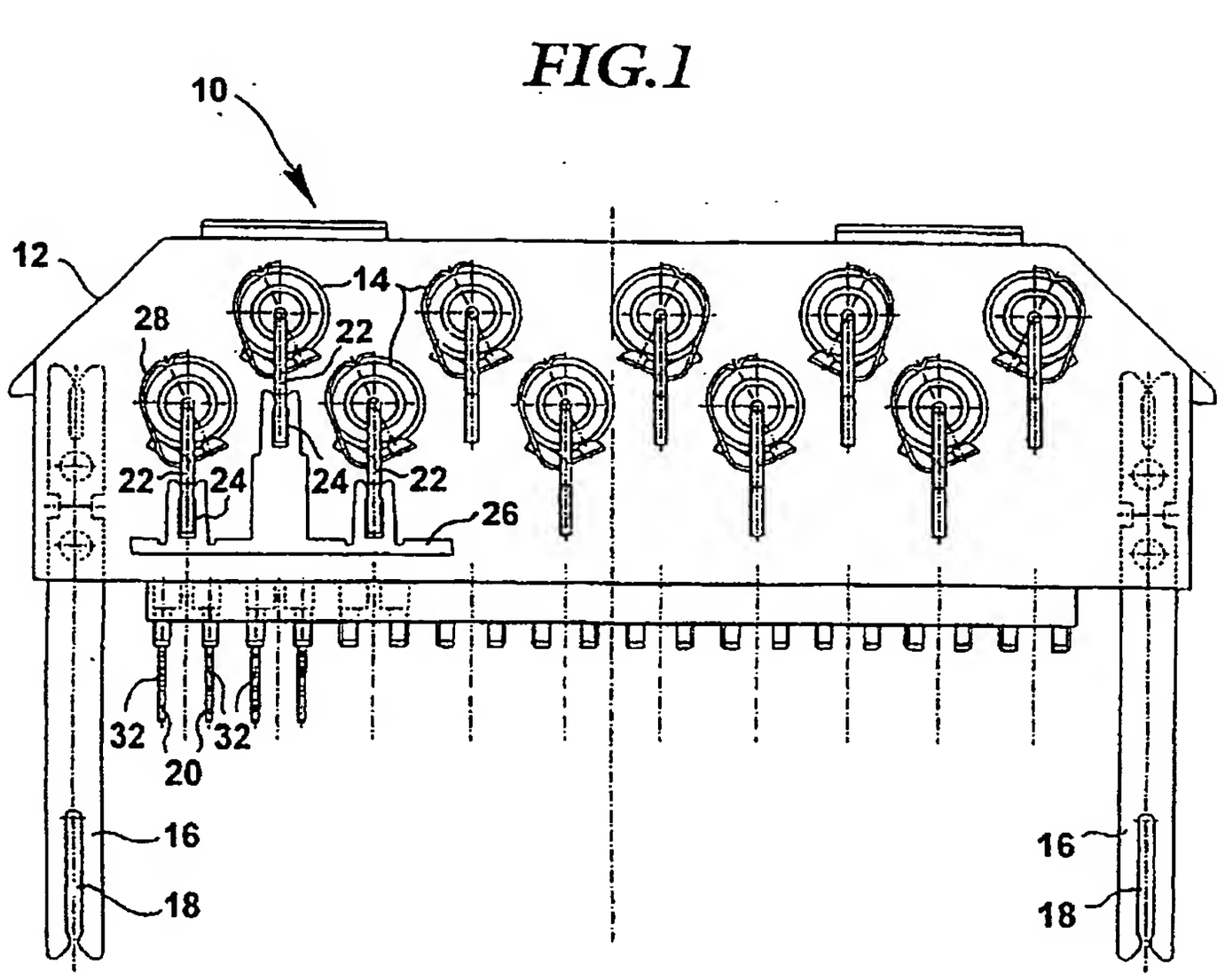

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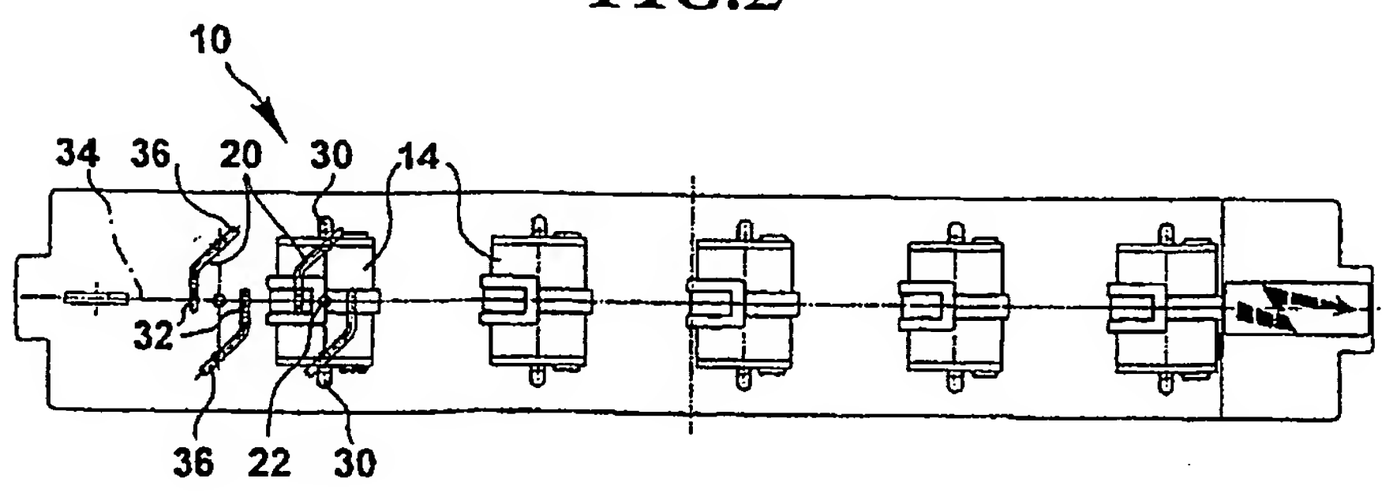
FIG.2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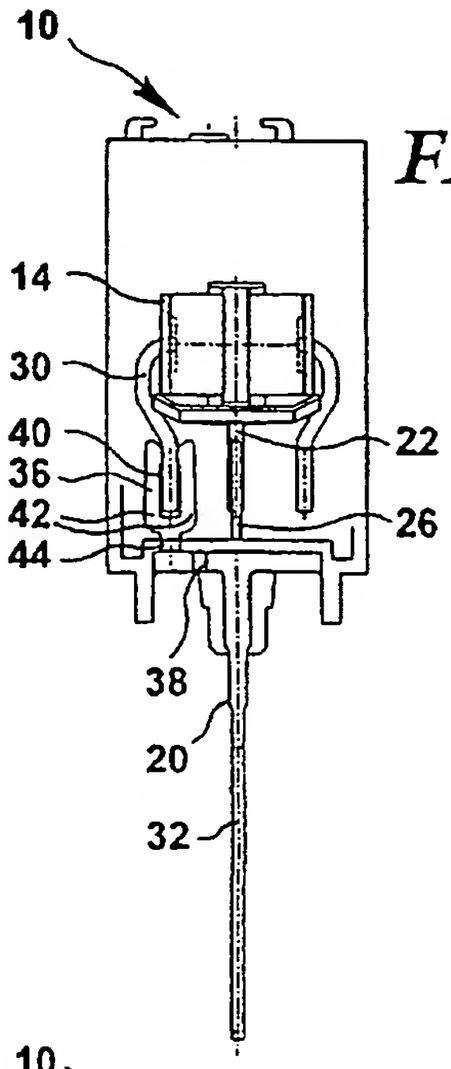

FIG.3

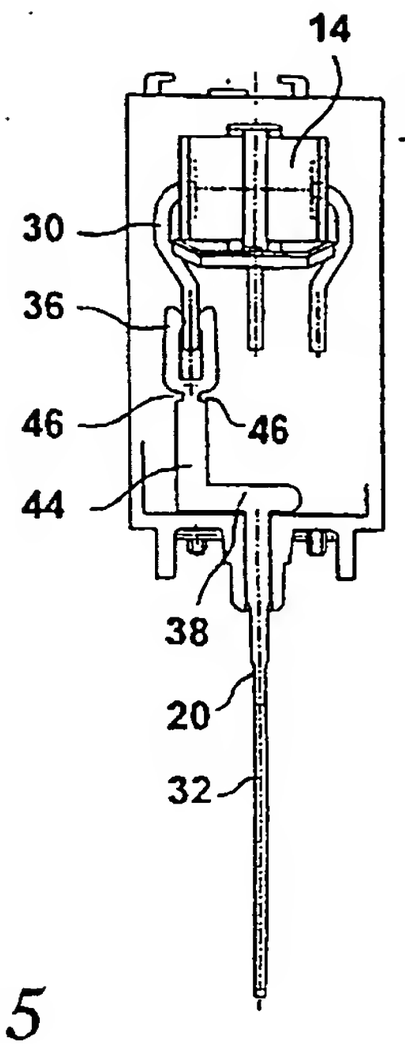

FIG.4

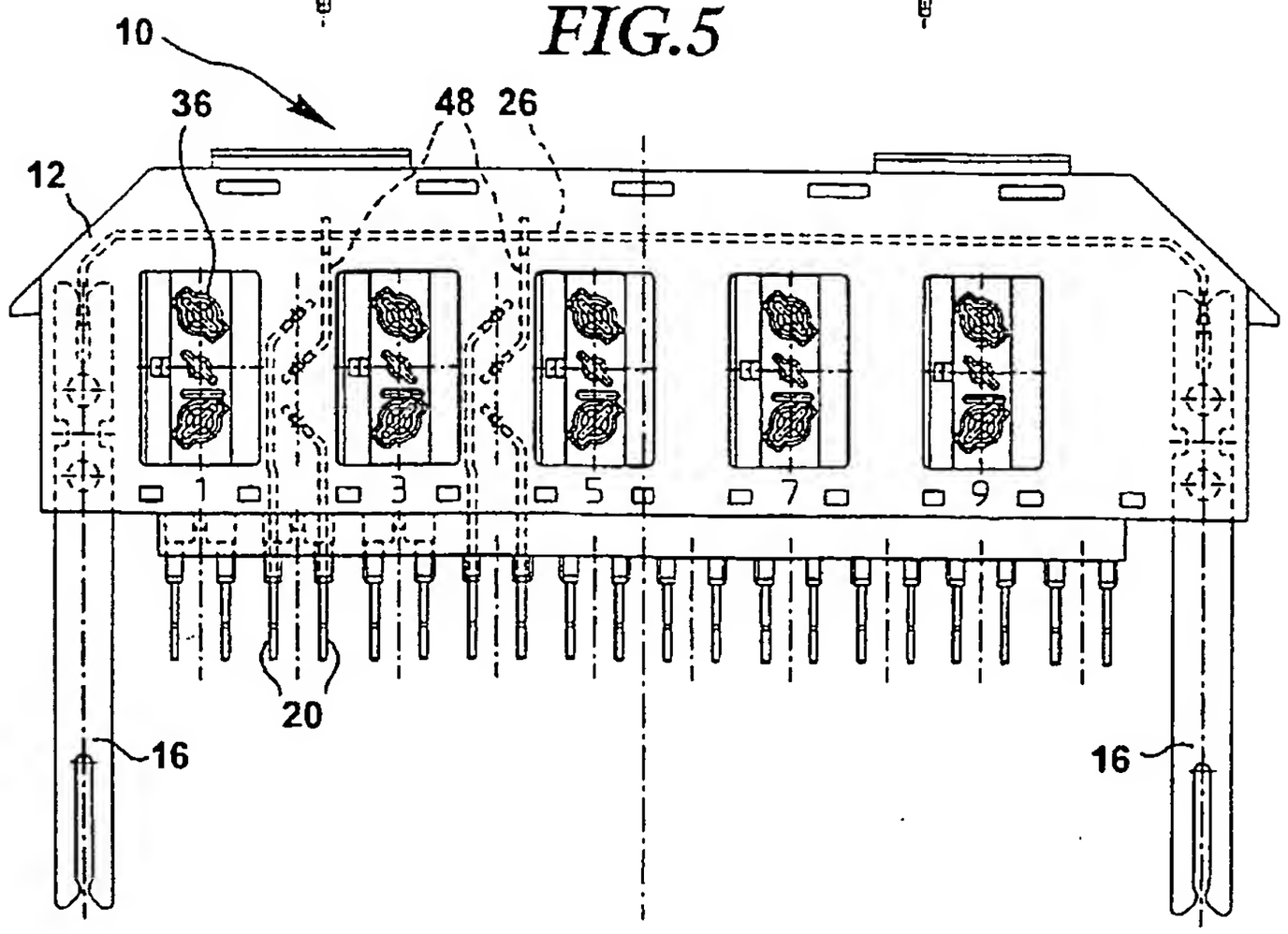

FIG.5

FIG.6

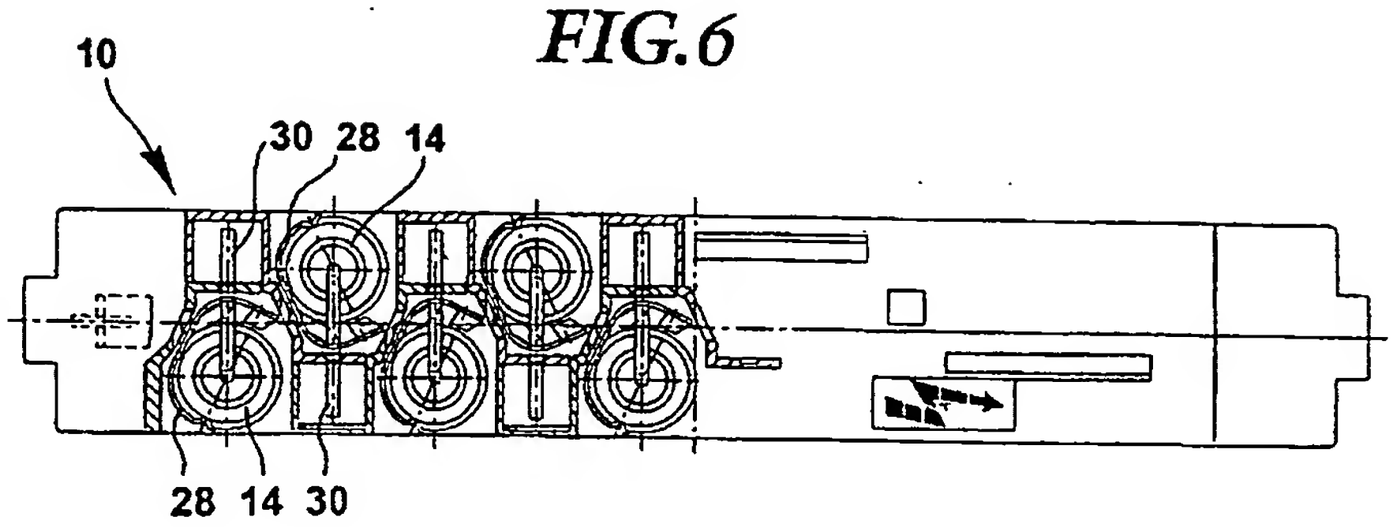

FIG.7

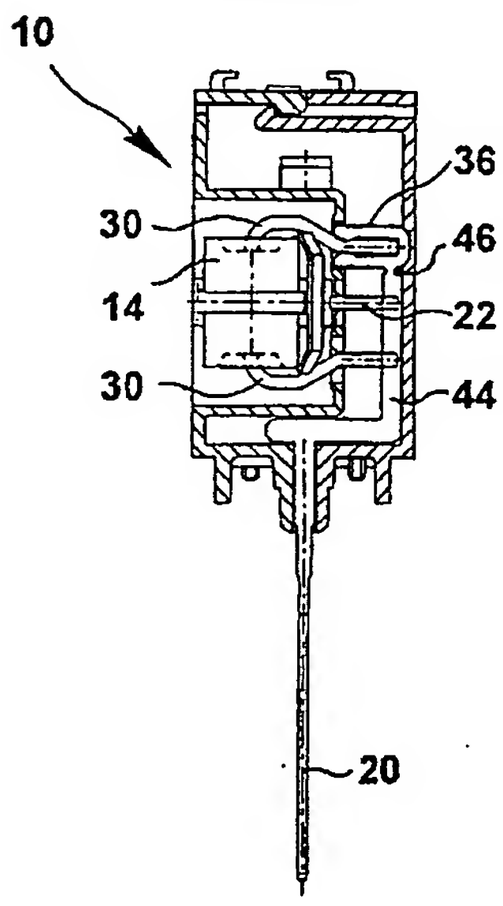

FIG.8